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## CLAIMS

1. A stent delivery system comprising:

a catheter, the catheter having a catheter shaft;

a medical balloon mounted on the catheter shaft, the medical balloon

5 having a non-inflated state and being inflatable to an inflated state, the medical balloon having a stent mounting region, and a stent disposed about at least a portion of the stent mounting region, the stent mounting region having a middle portion, a first end portion adjacent to the middle portion and a second end portion adjacent to the middle portion, the middle portion having a middle portion diameter, the first end portion having a first end portion diameter, the second end portion having a second end portion diameter, in the non-inflated state the middle portion diameter being greater than the first end portion diameter and the second end portion diameter, in the inflated state the middle portion diameter being substantially the same as the first end portion diameter and the second end portion diameter.

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2. The stent delivery system of claim 1 whereby, when the medical balloon is expanded the middle portion pushes *3* against the stent before the first end portion and before the second end portion.

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3. The stent delivery system of claim 1 wherein when the balloon is in the non-inflated state the middle portion diameter is between about 0.1 - 0.25 mm greater than the first end portion diameter and the second end portion diameter.

4. The stent delivery system of claim 1, the medical balloon further comprising:

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a first cone, the first cone being immediately adjacent to the first end portion, the first cone having a first waist, the first waist having a first waist diameter, the first waist engaged to a first portion of the catheter shaft, the first end portion diameter being greater than the first waist diameter; and

30 a second cone, the second cone being immediately adjacent to the second end portion, the second cone having a second waist, the second waist having a second

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waist diameter, the second waist engaged to a second portion of the catheter shaft, the second end portion diameter being greater than the send waist diameter.

22 The stent delivery system of claim 1 further comprising at least one stent 5 retaining sleeve, the at least one stent retaining sleeve having a stent retaining portion disposed about one end of the stent and a catheter engagement portion engaged to a portion of the catheter shaft adjacent to the medical balloon.

23 The stent delivery system of claim 1, the stent comprising an unexpanded state 10 and an expanded state, the stent further comprising a stent center, a first stent end and a second stent end.

24 The stent delivery system of claim 6 wherein when the balloon is expanded from the non-inflated state to the inflated state the stent is expanded from the unexpanded state 15 to the expanded state, such that the stent center is expanded before the first stent end and before the second stent end.

25 The stent delivery system of claim 8 wherein the at least one stent retaining sleeve being retracted off of the stent end during expansion of the stent, thereby releasing 20 the stent from the at least one stent retaining sleeve.

26 The stent delivery system of claim 1 wherein the balloon is manufactured from at least one member of the group consisting of: polyesters, polyethylene terephthalate, polybutylene terephthalate, PEBA<sup>X</sup>, Nylon, polyurethane, ARNITEL<sup>TM</sup>, polyolefin, 25 polyolefin compounds and any combinations thereof.

27 A stent delivery balloon having a non-inflated state and being inflatable to an inflated state, the balloon comprising:  
a stent mounting region, at least a portion of the stent mounting region 30 being constructed and arranged to dispository receive a stent thereabout, the stent mounting region having a middle portion, a first end portion adjacent to the middle

portion and a second end portion adjacent to the middle portion, the middle portion having a middle portion diameter, the first end portion having a first end portion diameter, the second end portion having a second end portion diameter, in the non-inflated state the middle portion diameter being greater than the first end portion

5 diameter and the second end portion diameter, in the inflated state the middle portion diameter being substantially the same as the fist end portion diameter and the second end portion diameter;

a first cone, the first cone being immediately adjacent to the first end portion, the first cone having a first waist, the first waist having a first waist diameter, the  
10 first end portion diameter being greater than the first waist diameter; and

a second cone, the second cone being immediately adjacent to the second end portion, the second cone having a second waist, the second waist having a second waist diameter, the second end portion diameter being greater than the send waist diameter.

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N. A stent delivery balloon having a non-inflated state and being inflatable to an inflated state, the stent delivery balloon comprising:

a stent mounting region, the stent mounting region having a middle portion, a first end portion adjacent to the middle portion and a second end portion  
20 adjacent to the middle portion, the middle portion having a middle portion diameter, the first end portion having a first end portion diameter, the second end portion having a second end portion diameter, in the non-inflated state the middle portion diameter being greater than the first end portion diameter and the second end portion diameter, in the inflated state the middle portion diameter being substantially the same as the fist end portion diameter and the second end portion diameter.

12. A stent delivery system comprising:

a catheter, the catheter having a catheter shaft;  
a medical balloon mounted on the catheter shaft, the medical balloon  
30 having a non-inflated state and being inflatable to an inflated state, the medical balloon having a stent mounting region, and a stent disposed about at least a portion of the stent

mounting region, the stent mounting region having a middle portion, a first end portion adjacent to the middle portion and a second end portion adjacent to the middle portion, the middle portion having a middle portion diameter, the first end portion having a first end portion diameter, the second end portion having a second end portion diameter, in 5 the non-inflated state the middle portion diameter being less than the first end portion diameter and the second end portion diameter, in the inflated state the middle portion diameter being substantially the same as the first end portion diameter and the second end portion diameter.

10 ~~13~~<sup>10</sup> The stent delivery system of claim ~~12~~<sup>9</sup> whereby, when the medical balloon is expanded the first end portion and the second end portion pushes against the stent before the middle portion.

15 ~~14~~<sup>11</sup> The stent delivery system of claim ~~12~~<sup>9</sup> wherein when the balloon is in the non-inflated state the middle portion diameter is between about 0.1 - 0.25 mm less than the first end portion diameter and the second end portion diameter.

20 ~~15~~<sup>12</sup> The stent delivery system of claim ~~12~~<sup>9</sup> the medical balloon further comprising:  
a first cone, the first cone being immediately adjacent to the first end portion, the first cone having a first waist, the first waist having a first waist diameter, the first waist engaged to a first portion of the catheter shaft, the first end portion diameter being greater than the first waist diameter; and  
25 a second cone, the second cone being immediately adjacent to the second end portion, the second cone having a second waist, the second waist having a second waist diameter, the second waist engaged to a second portion of the catheter shaft, the second end portion diameter being greater than the second waist diameter.

30 ~~16~~<sup>13</sup> The stent delivery system of claim ~~12~~<sup>9</sup> further comprising at least one stent retaining sleeve, the at least one stent retaining sleeve having a stent retaining portion disposed about one end of the stent and a catheter engagement portion engaged to a portion of the catheter shaft adjacent to the medical balloon.

17. The stent delivery system of claim 12, the stent comprising an unexpanded state and an expanded state, the stent further comprising a stent center, a first stent end and a second stent end.

5 18. The stent delivery system of claim 17 further comprising at least one stent delivery sleeve, the at least one stent retaining sleeve being retracted off of the stent ends during expansion of the stent, thereby releasing the stent from the at least one stent retaining sleeve.

10 19. The stent delivery system of claim 18 wherein the balloon is manufactured from at least one member of the group consisting of: polyesters, polyethylene terephthalate, polybutylene terephthalate, PEBA<sup>TM</sup>, Nylon, polyurethane, ARNITEL<sup>TM</sup>, polyolefin, polyolefin compounds and any combinations thereof.

15 20. A stent delivery balloon having a non-inflated state and being inflatable to an inflated state, the balloon comprising:

a stent mounting region, at least a portion of the stent mounting region being constructed and arranged to dispository receive a stent thereabout, the stent mounting region having a middle portion, a first end portion adjacent to the middle portion and a second end portion adjacent to the middle portion, the middle portion having a middle portion diameter, the first end portion having a first end portion diameter, the second end portion having a second end portion diameter, in the non-inflated state the middle portion diameter being less than the first end portion diameter and the second end portion diameter, in the inflated state the middle portion diameter

25 being substantially the same as the <sup>first</sup> end portion diameter and the second end portion diameter;

a first cone, the first cone being immediately adjacent to the first end portion, the first cone having a first waist, the first waist having a first waist diameter, the first end portion diameter being greater than the first waist diameter; and

30 a second cone, the second cone being immediately adjacent to the second end portion, the second cone having a second waist, the second waist having a second

waist diameter, the second end portion diameter being greater than the send waist diameter.

~~21.~~ A stent delivery balloon having a non-inflated state and being inflatable to an  
5 inflated state, the stent delivery balloon comprising:

a stent mounting region, the stent mounting region having a middle portion, a first end portion adjacent to the middle portion and a second end portion adjacent to the middle portion, the middle portion having a middle portion diameter, the first end portion having a first end portion diameter, the second end portion having a  
10 second end portion diameter, in the non-inflated state the middle portion diameter being less than the first end portion diameter and the second end portion diameter, in the inflated state the middle portion diameter being substantially the same as the fist end portion diameter and the second end portion diameter.

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